

THESIS

A STUDY OF CATTLE RANCH
ORGANIZATION AND MANAGEMENT IN
LARIMER COUNTY, COLORADO

Submitted by
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In partial fulfillment of the requirements
for the Degree of Master of Science
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I HEREBY RECOMMEND THAT THE THESIS PREPARED UNDER MY
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CHAPTER I

INTRODUCTION

The Problem

The problem of securing the greatest possible return with the least expense is present in any form of business enterprise. The success with which this problem is handled depends to a large extent upon the organization and management of that business enterprise. Thus, this problem as it relates to the livestock industry has existed in Larimer County, Colorado, since the organization of the first ranches in the area. Varying factors such as weather conditions, over-grazing, disease, predatory animals, labor supply, and feed and livestock prices have influenced the solution of the problem. During favorable periods some of these factors have not been pressing for the ranchers have been able to meet expenses. During other periods, however, they have been of utmost importance. Cattlemen in Larimer County, Colorado, consider that the four years prior to and including 1933 have constituted at least part of an unfavorable period. As will be shown later the moisture supply has been scant and the prices obtained for livestock relatively low. As a result the problem of securing the greatest possible return from their ranch operations with the least expense

has assumed major importance.

It has long been recognized that wide variations exist in percent return on investment from cattle ranches in any given area, yet little has been published concerning the specific factors which have the greatest effect upon income in this particular area. For this reason it seemed worth while to make a study of this cattle ranching area.

In this study an attempt will be made to determine some of the factors which govern cattle ranch organization and management in Larimer County, Colorado, and as a result to obtain definite suggestions for cattle ranch improvement in this and similar areas.

Description of Area

1. Location

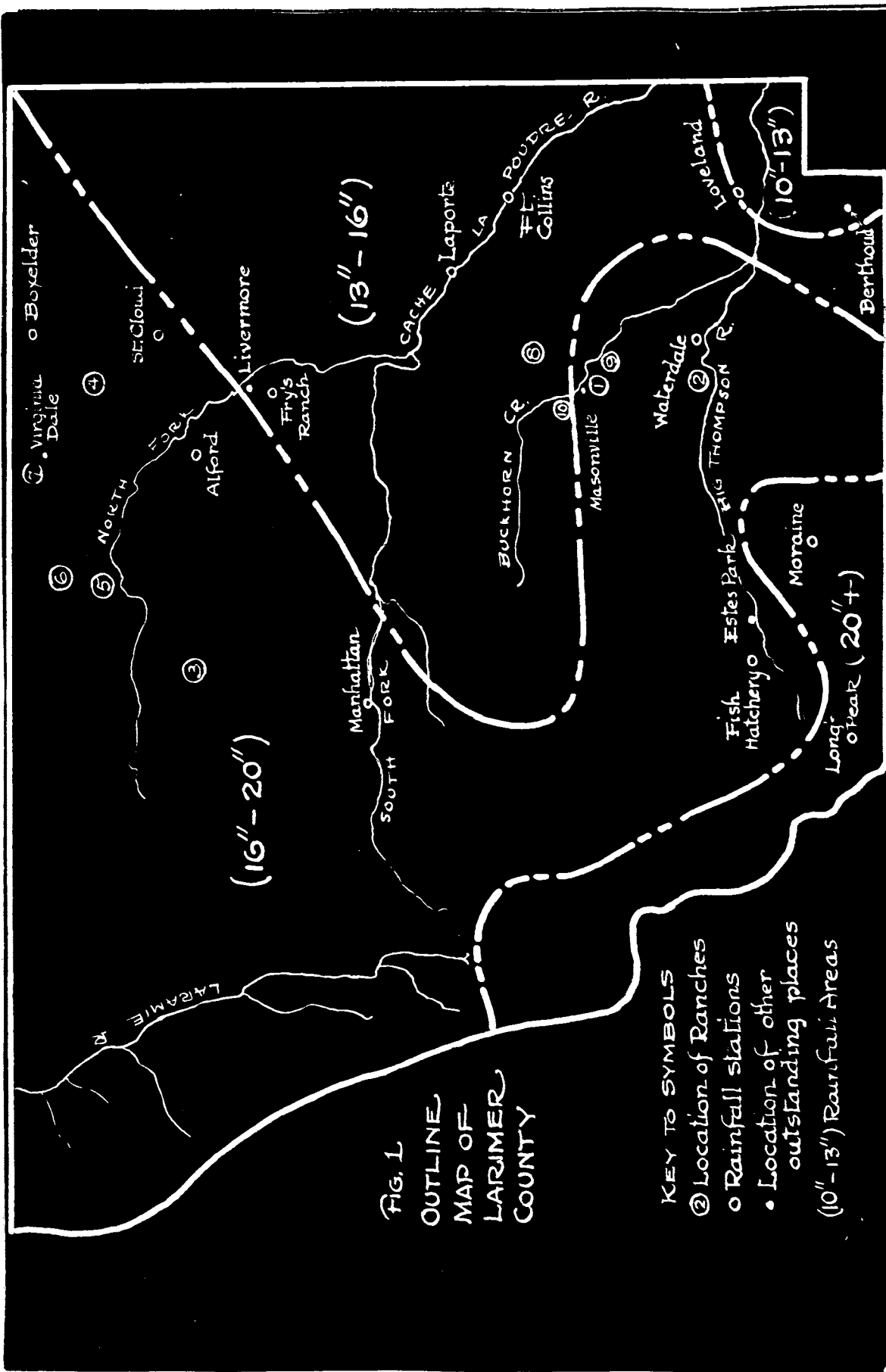
The ranches included in this study are located in the central part of Larimer County, Colorado. This region, which includes somewhat more than one-half of the total area of the county, is drained by the Cache la Poudre and Big Thompson rivers and their tributaries. The eastern limits of the area are the ranges of foothills which rise a few miles west of the cities of Fort Collins and Loveland. The approximate locations of the ten ranches studied are given on the map of Larimer County which accompanies this section.

2. Topography

The topography of this area varies greatly. There are open valleys and parks where a large portion of the land may be tilled, and there are precipitous mountain sides where little vegetation grows. Between these two extremes, however, falls the greatest portion of the area. This portion varying from rolling foothills to steep mountain slopes is used chiefly for the grazing of livestock. Included in this section is a photograph of a mountain valley ranch typical of this area.

3. Climate

Although climatic conditions may differ from year to year there is little variation within the area during any one year. Most of the area lies within the 16 to 20 inch rainfall belt although a small portion of the





A Mountain Valley Ranch,
Larimer County, Colorado

central eastern edge comes within the 13 to 16 inch rainfall belt (15). Long time records secured from various weather stations located within the area show that the largest part of the precipitation falls during the spring and summer months (16). The fact that the preponderance of the precipitation does fall in the form of rain rather than snow may have a direct bearing on the common practice of winter grazing within the area. A light snowfall during the winter months is not usually a serious hindrance to winter grazing, for either wind or sun may quickly restore the pasture. Due to the location of the area with reference to the mountains it is well protected from strong winds. The average frost-free period is slightly over one hundred days. A summary of weather conditions as recorded at various weather stations in the region is given in Table I (16). In the case of some stations the records are not continuous. They are the only records available for this area, however.

It will be noted that the elevation of the various weather stations varies from 8,956 feet in the case of the Long's Peak Station to 4,985 feet for the Fort Collins Station. It will also be noted that the frost-free period averages considerably longer for the stations with lower elevations. Along with this it is apparent that the average precipitation tends to be low where the elevation is low. Information presented in Table I would indicate that the average rainfall for the Loveland and Manhattan stations was unaccountably lower than for other

Table I: Summary of Weather Conditions in Larimer County, Colorado, United States Weather Bureau Bulletin W. Climatological Data

Station	Elevation	Ave. Frost Free Period	Ave. Rain-fall	No. Yrs. Incl. in Record
* Alford	6318 ft.	118 days	17.37 in.	19
* Boxelder	7000	**	17.11	17
Estes Park Fish Hatchery	8000	110	18.93	28
Fort Collins	4985	142	14.85	62
* Fry's Ranch	7500	97	17.00	14
Laporte	5069	**	15.32	34
Long's Peak	8956	59	22.08	42
Loveland	5000	**	11.88	12
* Manhattan	7400	**	14.03	6
Moraine	7750	88	16.06	27
* St. Cloud	7750	**	16.32	22
* Waterdale	5206	144	16.02	28

* Stations located in region near where ranches studied were located.

** Information incomplete in Climatological Bulletin.

stations in the area. A study of weather bureau data for this area reveals, however, that records at these stations were kept for only a comparatively short period of years. The period included for Loveland was from 1887 through 1897, and for Manhattan from 1891 through 1896. Obviously, the record of this short period of years does not furnish a reliable basis for determining the average long time record for these stations. A further study of climatological data for the county indicates that the period from 1885 through 1897 was one of below average precipitation for most of the stations located in the county.

4. Type of Farming

It is rather difficult to secure data relative to the type of farming in subdivisions of Larimer County.

Data bearing on the entire county are available, however, and from these information may be obtained that will give at least a partial picture of the types of farming of the central part of the county (13). In Table II the farm land, the number of farms in the county, and the income derived are listed according to type of farming.

Table II: Farm Land, Number of Farms, and Income by Type-
Larimer County, 1930 Census (13)

Type	Acres	Number	Total Income
All Types	698,304	1,838	\$9,385,657
General	43,482	223	464,902
Cash-Grain	51,259	123	398,107
Crop- Speciality	77,075	470	1,687,188
Fruit	6,699	146	406,142
Truck	420	18	27,407
Dairy	27,395	140	296,310
Animal- Specialty	47,956	233	4,620,222
Stock-Ranch	387,042	136	869,821
Poultry	3,051	73	124,921
Self-Sufficing	5,041	35	12,357
Abnormal	26,063	132	478,280
Unclassified	22,821	109	-----

A study of the above table will indicate that over one-half the total area of the county was classed as stock-ranch land. Although stock ranches were not numerous in the county, there being only 136 of them, they were important from the point of view of type of farming because they occupy by far the largest area of any type of farm. As will be noted, they ranked third in total income compared with the other types.

Farms by size are listed in Table III. The most common size of farm in Larimer County in 1930 was from 100 to 174 acres in area. This is considerably smaller

Table III: Farms by Size--Larimer County, 1930 Census (13)

Size	Number
Under 3 acres	33
3 to 9 acres	162
10 to 19 acres	136
20 to 49 acres	182
50 to 99 acres	296
100 to 174 acres	443
175 to 259 acres	168
260 to 499 acres	194
500 to 999 acres	96
1000 to 4999 acres	104
5000 acres and over	24
Total	1838

than the average size of stock ranch in the county as shown by the 1930 census. This classification, however, includes all types of farms in the county.

Inasmuch as the study deals largely with stock ranches an analysis of their number and size in the county is desirable. Such an analysis is given in Table IV.

Table IV: Number and Size of Stock Ranches, Larimer County, 1930 Census (13)

Size	Number
Under 3 acres	0
3 to 99 acres	5
100 to 259 acres	2
260 to 499 acres	15
500 to 999 acres	28
1000 to 4999 acres	62
5000 to 9999 acres	20
10000 acres and over	4
Total	136

It may be observed from this study that although stock ranches are not the most numerous type in the county they are the most extensive from the point of view of total area. It may also be observed that the most common

size of stock ranch in the county is much larger than the most common size of farm. Table IV reveals that the most common size of stock ranch reported by the 1930 census was from 1,000 to 4,999 acres in area. Nearly one-half of the total number of stock ranches fell in this group. Only two of the stock ranches listed in Table IV were of the same general size as the most common size of farm as shown in Table III.

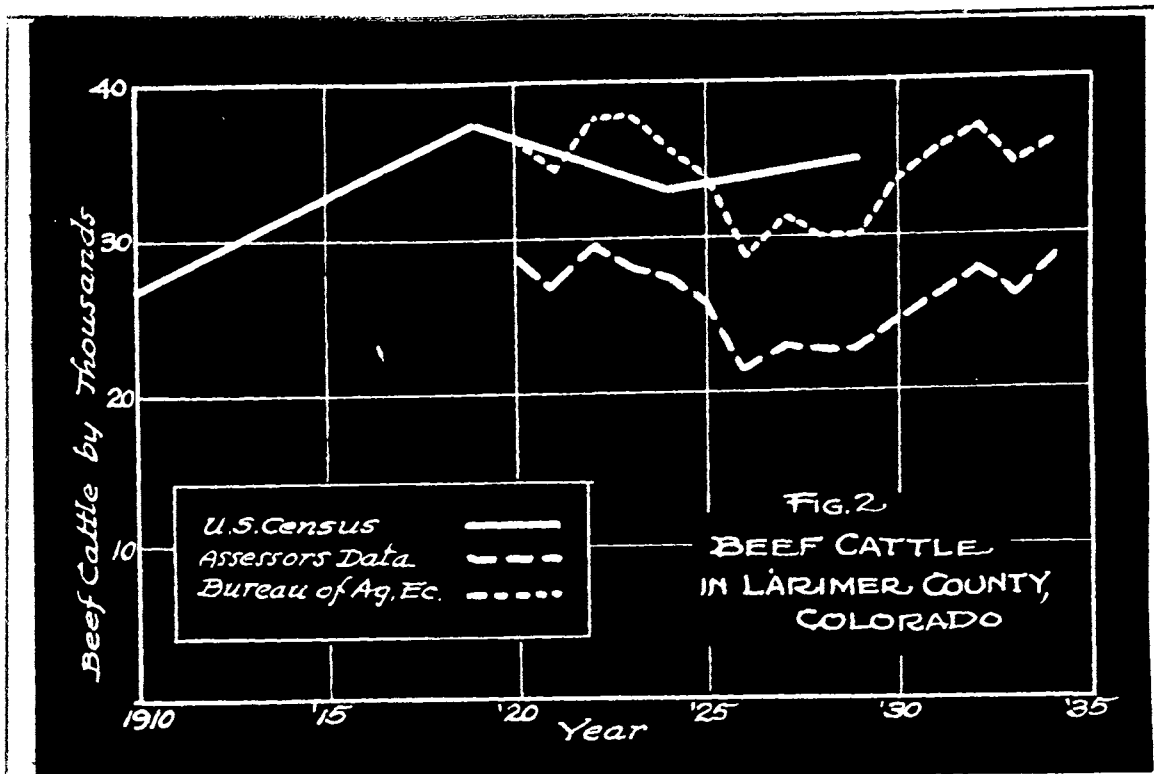
History and Importance of Cattle Ranching in Area

The history of cattle ranching in Larimer County dates well back into the previous century. Ansel Watrous in a History of Larimer County, Colorado, has contributed much information relative to the beginning of livestock ranching in the county (7). According to his account the first settler to arrive in the Big Thompson valley was Mariana Modena, a man of Spanish-Indian descent, who arrived from the San Luis valley in the spring of 1858. This author tells of large herds of cattle that were pastured in the region of the Big Thompson and its tributaries in the late 60's and early 70's. As far as the northern end of the county is concerned Watrous gives the date of arrival of the first settler in the Livermore area as 1863. The Overland Stage Company established a division station at Virginia Dale in the extreme northern part of the county in 1862 but no settlers arrived there to locate permanently until 1872.

The earlier settlers in the county pastured their stock on land a goodly portion of which is now used primarily for the production of crops other than pasture. As other types of agriculture such as grain and fruit production were developed, competition for the best land crowded the livestock to land that was not suitable for intensive forms of agriculture. A considerable portion of Larimer County, however, is composed of such land and for this reason the livestock industry has remained im-

portant in the county. Of course much of the farm land in Larimer County, although not used for grazing, is utilized to produce livestock feed directly through hay production and silage or indirectly through the production of crop by-products such as corn stover, straw, and sugar beet tops.

From the early settlement of the county until the present time cattle ranching has been an important industry in Larimer County. There are several sources available from which information concerning its importance relative to other industries may be obtained. These sources are the United States Census Data, the Division of Crop and Livestock Estimates, Bureau of Agricultural Economics, Department of Agriculture, and various editions of the Colorado Year Book. Although these sources of information are not always in agreement they do indicate the same general trends that the livestock industry has followed in the country over a period of years. The Twelfth Census Data (9) list the Jackson County area with the Larimer County area so that the figures are not comparable with those for later dates. As the first issue of the Colorado Year Book was not published until 1920 there is no source of definite early information available. The Thirteenth Census Data record 26,139 head of range cattle in the county in 1909 (10). The Fourteenth Census Data (11) record approximately 10,000 more head in the county in 1919, while the Fifteenth Census Data (12) record for



1929 a slight decrease from the 1919 point. Figure 2 presents this information graphically.

A partial explanation of the variation found among these sources probably lies in the fact that information was secured by census takers and assessors by personal solicitation while this was not true of information secured by the Bureau of Agricultural Economics.

According to the 1930 census all types of farm land in the county comprise a total of 698,304 acres of which 387,042 acres are given over to stock ranches (13). The 1932 Colorado Year Book contains data showing that over one-third of the county is classed as grazing land (15). With such a large portion of the county suitable only for stock raising it is not surprising that cattle ranching should be a very important industry in Larimer County.

Review of Literature

There is very little material available that deals specifically with cattle ranch organization and management in Larimer County, Colorado. A study of thirty-two mountain ranches was made by R. T. Burdick, Martin Reinholt, and G. S. Klemmedson of the Colorado Agricultural College Experiment Station (2). Only two of the mountain ranches were located in Larimer County, the majority being in Jackson County. While this study was based on ranch records secured in several Colorado counties the methods used and results obtained may be of value when conducting a similar study in Larimer County. These investigators from the Colorado Station carried on their work in cooperation with ranchers for the period of years from 1922 through 1925 inclusive. The main divisions of the study were Organization of Ranches Studied, Ranch Management, Marketing Cattle, and Profitable Ranch Organization.

Work similar in many respects to that done in Colorado was carried on by A. F. Vass and Harry Pearson of the Wyoming Agricultural Experiment Station (6). These men obtained detailed records from forty-seven cattle ranches located in the mountains of southwestern Wyoming. The period studied was the calendar year of 1926.

The University of Nevada Agricultural Experiment Station conducted a study of cattle ranch operation in that state for the period of years from 1928 to 1930

inclusive. Very definite suggestions based on an analysis of this study are given in a Nevada Agricultural Experiment Station Bulletin (1).

A joint survey of sixty-three cattle ranches in Arizona covering the year 1925 was made by the University of Arizona and the United States Department of Agriculture (5). While some factors faced by cattlemen of Arizona, such as type of feed and disease control, are different from those faced by cattlemen of Larimer County, Colorado, still many factors do exist that are common to both areas. The most profitable size and arrangement of ranch must be determined in each locality as well as the number of livestock units to be carried per acre and per man equivalent.

In the following study information contributed by others will be used whenever it may have any bearing on the particular question at hand.

Method of Procedure

The ranch records used as a basis for this study were secured by the writer directly from the ranchers. The records of ranch business cover the calendar year of 1933. In addition, statements concerning ranch management over a period of years were obtained from the ranchmen. Records secured were from ten livestock ranches in Larimer County, Colorado. One was located in the Big Thompson River valley, three in the Buckhorn region, one in the Horsetooth area, one in the Log Cabin area, one in the Livermore area, and three in the Virginia Dale region. While an attempt was made to secure ranches from the different areas of Larimer County no definite statement can be made as to whether or not the ranches selected were entirely representative of the whole. In a later section of this study, however, these ten ranches will be compared with all stock ranches in the county in certain respects.

The records were summarized using United States Department of Agriculture Farm Management Summary Sheets for Northern States. The tables and charts used in the analysis were developed from these summary sheets. Because of the limited number of units in the sample the case method of study was used for the most part in this analysis. Each ranch was studied and compared with others of the group.

Definition of Terms

<u>Term</u>	<u>Definition</u>
Man equivalent	The total number of months of man labor required on one ranch for one year divided by twelve.
Acres per man equivalent	The total number of acres in the farm divided by the man equivalent.
Acres per productive animal unit	The total number of acres divided by the number of productive animal units.
Productive animal unit	Any calf less than one year of age equals 0.5 animal unit. Any animal more than one year of age equals one animal unit. One hog equals 0.3 animal unit. Horses were not produced on any of the ranches studied so were not considered to be productive animals.
Productive animal units per man equivalent	The total number of productive animals divided by the man equivalent.
Percent calf crop	The number of calves at weaning time divided by the number of females in the herd at breeding time.
Percent death loss	The number of deaths divided by the number of animals in the herd at the beginning of the year.
Value of feed other than pasture fed per productive animal unit	Total value of feed other than pasture divided by the total number of productive animal units.
Dollars of investment per productive animal unit	Total beginning investment divided by the number of productive animal units.
Percent of total investment in productive animals	Investment in productive animals divided by the total investment.
Current expense	All cash expense other than interest involved in the operation of the farm.
Total expense	Includes current expense, unpaid family labor, depreciation, and decrease feed and supplies.

<u>Term</u>	<u>Definition</u>
Unpaid family labor	All unpaid labor other than that of the operator.
Depreciation	The annual reduction in value of an item based on the original cost and the total length of life of the item.
Feed and supplies	Includes feed and all supplies listed in the inventory.
Total receipts	All farm income both cash and increase in inventory.
Farm income	The amount remaining after the total expenses have been subtracted from the total receipts.
Interest on investment	Approximate rate paid on borrowed capital; 6 percent was used in this study.
Labor income	The amount remaining after interest on investment has been subtracted from the farm income.
Value of operator's labor	The value placed upon the service of the ranch operator.
Income per dollar of expense	Total receipts divided by cash expense.
Return on investment	The amount remaining after the value of the operator's labor has been subtracted from the farm income.
Percent return on investment	The return on investment divided by the total beginning inventory.

Explanation of ranch layout as used in Tables V-A and X-A

A represents a ranch arranged in one piece with the headquarters located near the center. B represents a ranch in one piece but not compactly arranged and with headquarters near one side. C represents a ranch in two pieces with headquarters on one piece. D represents a ranch arranged in more than two pieces with headquarters on one piece. E represents a ranch arranged in more than three pieces with considerable distances between pieces of land.

CHAPTER II

DESCRIPTION OF SET-UP AND STUDY
OF MANAGEMENT FACTORS OF TEN CATTLE
RANCHES IN LARIMER COUNTY, COLORADO

A description of the set-up of these ten cattle ranches should accompany the study of their management factors. Such a description will be of far more value to this study if it is combined with the study rather than if it were given in a separate section. Therefore, the description of these ten ranches will be presented in both tabular form and word picture as it is needed to complete the study of the various management factors. Throughout this study the percent return on investment will be used as the measure of success for all management factors.

Size and Arrangement

As will be noted from Table V-A the size of ranch varies from 1210 acres to exactly ten times that area or 12,100 acres. This largest ranch, however, is nearly twice as large as the next in size. The average size of ranch studied was 3996 acres which is considerably larger than the average size of stock ranch in the county as given by the Fifteenth Census Data (13), which is 2846 acres. According to this same source of information the 1,000 to 4,000 acre size is the most common in

the county. All save the two largest ranches in this study came within this classification. The most common size of ranch studied was from 3,000 to 3,400 acres. Only three of these ten ranches, numbers 1, 3, and 9, secured favorable returns on investment and it will be noted that they are all medium size ranches. There is only a difference of 305 acres in size between the largest and the smallest of these three ranches.

The type of layout on these ranches varies greatly. The layout of Ranch 3 was best. The land was in one area and the headquarters were in the approximate center of the area. The return on investment for this ranch was far better than that on any other. The other two ranches that secured favorable returns, however, were rated very poor in type of layout. Judging by these ten ranches the factor of arrangement of layout was not sufficiently important to influence greatly the rate of return. However, the importance of arrangement of buildings, fields, and pastures should not be overlooked for it has a direct bearing upon crops produced on different parts of the ranch. Crops needing frequent attention are apt to be planted near the headquarters thus throwing the crop rotation out of balance. Pasture near the ranch headquarters is often more heavily grazed than pasture farther away either because the stock tends to stay there or because it is convenient to keep it near at hand.

G. S. Klemmedson, in *An Economic Study of the Range Cattle Industry in Colorado* (4), devotes consider-

Table V-A: Summary of Description of Ten Cattle Ranches in Larimer County, Colorado

Ranch Number	Size in Acres	Lay-out	Man Eq.	Prod. An. Units	Prod. An. Units Per Man Eq.
1	3345	E	1.33	82	62
2	1210	D	1.08	105	97
3	3200	A	2.04	352	173
4	12100	B	2.33	485	208
5	4080	B	1.42	223	157
6	2527	C	2.04	58	28
7	6680	C	1.66	265	159
8	1520	C	1.25	37	30
9	3040	E	2.12	112	53
10	2259	C	1.42	119	84
Ave.	3996	C	1.67	185	107
High	12100	A	2.33	485	208
Low	1210	E	1.08	37	28

Table V-B: Description Continued:

Ranch Number	Pasture A. Per Man Eq.	Crop A. Per Man Eq.	Total A. Per Man eq.	Pasture A. Per P.A.U.	Crop A. Per P.A.U.
1	2394	121	2515	38.84	1.96
* 2	1052	68	1120	10.80	0.70
* 3	1544	25	1569	9.86	0.14
* 4	5124	69	5193	24.57	0.33
* 5	2771	102	2873	17.65	0.65
6	1198	41	1239	42.00	1.60
7	3952	72	4024	24.75	0.45
8	1152	64	1216	40.94	2.16
* 9	1382	52	1434	26.11	0.99
*10	1552	39	1591	18.54	0.46
Ave.	2214	63	2277	25.53	0.57
*High	5124	121	5193	42.00	2.16
Low	1052	25	1120	9.86	0.14

Table V-C: Description Continued:

Ranch Number	Total A. Per P.A.U.	Percent Calf Crop	Percent Death Loss	Val. Fed Per P.A.U.	%Cur. Exp. Represented By Feed
1	40.8	60.53	2.25	\$ 3.25	8
2	11.5	90.77	2.17	5.20	45
3	10.0	61.00	1.68	1.88	7
4	24.9	56.22	0.70	4.55	25
5	18.3	58.28	6.30	5.11	21
6	43.6	70.00	5.33	22.24	25
7	25.2	45.51	7.60	4.54	9
8	41.1	46.15	2.17	9.05	46
9	27.1	55.69	3.86	4.02	13
10	19.0	73.08	1.03	7.55	57
Ave.	26.1	61.72	3.21	6.74	26
High	43.6	90.77	7.60	22.24	57
Low	10.0	45.51	0.70	1.88	7

* Made use of National Forest Grazing Land.

Table V-D: Description Continued:

Ranch Number	\$'s Invest. Per P.A.U.	% Total Invest. in P.A.	Income Per \$ Expense	% Return on Investment
1	329	7.4	1.53	0.17
2	92	19.4	1.09	-4.75
3	89	34.4	2.76	4.00
4	138	19.8	1.07	-0.39
5	176	15.2	1.14	-0.85
6	504	5.4	0.61	-3.57
7	164	13.9	0.57	-3.70
8	368	7.8	0.57	-6.88
9	100	18.0	1.56	0.35
10	114	14.3	1.19	-2.35
Ave.	207	15.4	1.23	-1.79
High	504	34.4	2.76	4.00
Low	89	5.4	0.57	-6.88

able space to a discussion of the ranch layout. He suggests that the best arrangement is to locate the headquarters in the center of the ranch or near the middle of one side. Certainly ranches that are badly scattered require more time in the moving of machinery and livestock than do ranches that are compact. It would seem that the larger the ranch the more important the matter of arrangement becomes because the distances to be traveled are greater. G. S. Klemmedson in the study just cited also holds to this view.

Number of Productive Animal Units

As may be observed from Table V-A the number of productive animal units on individual ranches in this study varies from a high of 485 on ranch number 4 to a low of 37 on ranch number 8. The average for the ten ranches was 185. Four of the ranches had between 100 and 199 productive animal units each. The number of produc-

tive animal units on these ranches did not vary directly with the size of the ranch.

The 1935 agricultural census (14) was summarized both on a county and a precinct basis. For purposes of comparison the average number of productive animal units per ranch was calculated for two precincts that contain several of the ranches included in this study. The average number of productive animal units on the three ranches located in the Masonville precinct was 104 while the average for the 26 farms in the precinct based upon the 1935 census was 35.96. The average number of productive animal units on the four ranches of this study that were located in the Virginia Dale precinct was 285 while the average calculated on 1935 census data was 84.48. The fact that the average number of productive animal units as calculated on the 1935 census was far lower may indicate that the ranches selected from these precincts for this study were not representative or it may indicate that many of the ranches in the precincts produced cattle only as a comparatively minor enterprise.

In Table V-B and Table V-C the factor of acres per productive animal unit is presented for these ten ranches. This factor has been divided into crop acres per productive animal unit and pasture acres per productive animal unit. It will be noted that Ranch 3, which was the most profitable, was low with a total of ten acres per productive animal unit. Of this total number, 9.86 acres were pasture and 0.14 acre was crop land. Contrasting

with this, Ranch 6 had 45.6 acres per productive animal unit of which 42 acres were pasture. Ranch 8 had the greatest crop area per animal unit, the number being 2.16 acres. These last two ranches were unprofitable. There seemed to be little relationship apparent between the net return and number of acres per productive animal unit. There are several factors which may influence this situation. The first is the type of land farmed. The crop land on some of the ranches was nearly all irrigated while on others there was no irrigation. Drouth conditions may have affected certain localities more seriously than others. The non-irrigated land would suffer the most in this case. Again, however, there appeared to be little relationship between the type of crop land and the number of acres per animal unit. Rather it seemed that some of the ranch operators were more inclined to trust to luck than were others. The matter of use of National Forest grazing land, of course, influences the relationship on some of the ranches. Inasmuch as permits for grazing on the National Forest are based on number of head rather than number of acres it is difficult to arrive at an accurate estimate of the number of acres of range that is used. The factor of acres per productive animal unit as used in this study is based on the number of acres of land that is actually operated as one ranch unit. Several of the ranches in this study did not use National Forest land yet there was no apparent difference between the two types

as far as this factor was concerned. This may be true especially with regard to the net return from the ranches but it would seem that the use of this extra grazing land should influence the factor of acres per animal unit. The type of land, the precipitation, the operators's tendency to skimp on feed during some particular year, and the use made of National Forest grazing land all blend together to obscure the exact value of this factor of acres per productive animal unit.

Feeds and Feeding Practices

The problem of securing winter feed seemed to be a very important one to the operators of these ten ranches. Drouth conditions prevailed to a considerable degree in the entire area covered by the study. There was little uniformity in kinds of feed used although they were practically all roughages. Hay, corn fodder, straw, pea silage, beet tops, and even weeds cut as hay were used. In general, however, there was considerable uniformity in the method of feeding. Most of the ranchers made the utmost use of winter pasture supplementing it with additional feed only when absolutely necessary. Ranches 4 and 6 were the only ones that fed consistently during any considerable part of the winter.

The value of feed fed per productive animal unit varied decidedly on the different ranches. This measurement factor as presented in Table V-C reveals that Ranch 3 which was outstanding because of its 4.0 percent return

on investment was also outstanding because of its low figure of \$1.88 representing the value of feed, other than pasture, which was fed per productive animal unit. Ranches 1 and 9 which also secured favorable returns on investment placed next to Ranch 3 in the low value of feed fed per productive animal unit.

The explanation given in the above section with regard to the use of National Forest grazing land, the effect of drouth, and the tendency of certain ranchers to skimp on feed during some periods will explain to some extent the low figure for value of feed, other than pasture, fed per productive animal unit. If normal rainfall is experienced and maximum use is made of winter grazing the effect will be to lower feed costs. This practice of extensive winter grazing was followed by all three successful ranches. This practice had a direct effect upon the return on investment, for the purchased feed was a cash expense. Experience in this area over a period of several years has shown, however, that those ranch operators who feed consistently during the winter months will eventually gain more through increased weight of calves and consequent reduction in calf crop costs than they will lose in extra feed costs. In addition, if a man is to survive long in the range cattle business he must maintain a feed reserve especially for use in winter when snow covers the pasture land. An actual inspection of these ranches coupled with a study of their records indicates plainly that several of these ranch operators, particularly those

operating the three most successful ranches, had skimmed considerably on feed and had been very definitely trusting that the winter would be open. This practice was apparently successful during this one year but it is not one that will be successful over a period of years for a season is certain to come when snow will cover winter pasture and feeding will be necessary for many weeks. In this case the result is certain to be a loss for the ranch.

The percent of the current expenses that is represented by the purchase of feed is shown in Table V-C. It will be noted that some relationship apparently exists between the value of feed fed per productive animal unit and the percent of the current expenses that is made up by the purchase of feed. In both cases Ranch 3 is the lowest. Ranches 1 and 9 are also low while most of the ranches whose returns were unfavorable rated considerably higher. In the case of both factors the ranches whose returns on investment were favorable, ranked in the lower extreme of the rating. The average percent of the current expenses of these ten ranches that was made up of the purchase of feed was 26. In a study of thirty-two mountain ranches conducted in Colorado (2) it was found that 9.0 percent of the total ranch expense was represented by the purchase of feed and salt. This figure is considerably lower than the 26 percent average secured by the ten cattle ranches included in this study. The figure of 26 percent secured in this study is probably much higher than the average figure would be over a period of years because

during this year drouth cut down the amount of feed that was produced on many of the ranches. It is impossible to arrive at a figure that would be an average for a period of years because this study covered only one year. It is fairly safe to say, however, that over a period of years the cost of purchased feed other than pasture would be considerably less than 26 percent of the current expense. Certain individuals escape high feed costs on drouth years because they have maintained a supply of some type of feed above that needed for a normal year. This practice is a matter of individual ranch management to be recommended under most circumstances. This supply of feed should be produced on the ranch rather than purchased in order to secure the maximum use of labor and equipment that is available on the ranch.

Death Loss and Calf Crop

Death loss may present itself as a very important factor on any livestock ranch. Just as a farmer's income may be greatly curtailed by a hail storm so, too, may a ranchman's income be curtailed by death loss. In this particular study there was considerable variation in death loss among the ranches although in no instance was it excessively high. The average found in this study was 3.21 percent which is only slightly higher than the 3.10 percent death loss found in a study of thirty-two mountain ranches in Colorado (2). Table V-C presents the death loss

of each of these ten ranches. It is of interest to note that Number 4, the largest ranch studied both from point of view of acres and livestock units, incurred the lowest death loss. There seemed to be little relationship, however, between size and death loss as far as the ten ranches were concerned.

As revealed in Table V-C ranches 5,6, and 7 suffered the most severe death loss. The ranch operators in each of the three cases explained that the high losses were due to insufficient feed during the early spring months.

A comparison of death loss and return on investment revealed that as far as these ten ranches were concerned little relationship apparently existed. It is true that the three ranches that secured favorable returns suffered death losses of less than three percent but several of those whose returns were unfavorable also had death losses below that mark. Of course it cannot be said truthfully that death loss had no effect on return on investment for had it been possible to add the value of the lost animals to the ranch receipts the rate of return would surely have been higher. However, it seems that there must be other factors that have a greater effect on rate of return as far as this study is concerned.

Another factor which presents itself as being fully as important as death loss is calf crop. It is rather difficult to determine the calf crop accurately

because of the practice followed by some ranch operators of culling the breeding herd during the winter. Some men have been known to cull their herds just before calving time selling all cows that appeared to be without calf. As a result they were in a position to claim very high calf crops. Although such a practice possibly may be desirable the results obtained are not strictly comparable with results obtained when the herds are culled at the start of the breeding season for then the cows and heifers which will drop calves in the spring cannot be selected uniformly. In spite of this variation in determining the percent calf crop this management factor is important. Several factors contributed to the variation in percent of calf crop on these ranches. Sale of cows from the breeding herd some time after the breeding season had closed was one reason why the calf crop should appear in some cases to be very low. The percent of calf crop in all cases was determined by dividing the number of calves weaned by the number of cows in the breeding herd at the beginning of the breeding season. There were some differences apparent in number of cows per bull among these ranches which may have caused some variation in the calf crop. The fact that cows from some of the ranches pastured on very rough land during the breeding season and may, therefore, have become separated from bulls, may also have affected the calf crop.

In this study a comparison of calf crop and

return on investment revealed little more in the way of relationship than did the comparison of death loss and return on investment. As presented in Table V-C the smallest ranch studied, number 2, secured a 90.77 percent calf crop which was by far the best of the ten ranches studied. The average for the ten ranches was 61.72 percent which was slightly lower than the average of 64.00 percent found in the Colorado study cited above. The three ranches that obtained a favorable return on investment all obtained calf crops that were lower than the average for the ten ranches. Even though there did seem to be little relationship between calf crop and return on investment common sense would suggest that had any of the other nine ranches obtained a calf crop as high as that secured by Ranch 2 they would most certainly have enjoyed a much higher return on investment. It must be kept in mind that certain steps that might be taken to increase the calf crop may increase the ranch expense. An increase in the number of bulls, closer supervision of the breeding herd on the range, or the maintaining of additional pasture so that the breeding herd may be carefully controlled will contribute to an increase of calf crop costs. The increase in size of calf crop should, however, more than balance this increase in cost.

Results obtained in other studies indicate that death loss and calf crop have been found to be important factors of ranch success. Nevada workers (1) list fifteen

suggestions for cattle ranch operators to keep in mind. The first one is to get a good calf crop and the second is to hold the death loss below three percent.

As a result of a study conducted in Arizona (5) a combination of four factors was found to have a major influence on the rate of return on the invested capital. These factors were percent of investment in cattle, percent calf crop, percent death loss, and number of cows handled per man. The Arizona workers listed percent death loss as the most important single factor.

Whatever the exact importance of these two measurement factors may be it is quite certain that successful ranch operators watch them closely.

Labor Utilization

The problem of securing the best possible utilization of labor is one that is not usually overlooked by ranch operators. They realize that mismanagement in the use of labor will be readily transferred into cash expense.

Table V-A presents the man equivalent for each of the ranches studied. Man equivalent as used in this study was secured by dividing the total months of man labor used on a ranch by the number of months in a year. The smallest ranch studied, number 2, had the lowest man equivalent while the largest, number 4, had the highest. Nevertheless, this apparent relationship between size and labor utilization did not hold for all of the other eight

ranches. One fact, however, that undoubtedly had a bearing was the varying numbers of cattle kept on the different ranches. For instance, Ranch 1 which is just slightly larger than Ranch 3 ran less than one-fourth as many cattle and had a man equivalent of 1.33 while Ranch 3 had a man equivalent of 2.04.

In this study the average number of productive animal units per man was 107. The largest number per man, 208, was found on the largest ranch. The smallest number, 28, was not found on the smallest ranch, however. In a study of cattle ranch management in Wyoming (6) it was found that the average ranch used one man for the care of 131 units throughout the year. Livestock production was the only production enterprise on several of the ranches included in this study while there were other production enterprises on the remainder of the ranches. This same condition was present, however, in the Wyoming study just cited. On some of these Larimer County ranches all man labor was devoted in some manner to the production of livestock while on others, for instance, labor was used to produce grain for market. In all cases, however, livestock was the principal source of ranch income.

In this study acres per man equivalent seemed to have little influence on the return on investment.

The type of land and the use that was made of it varied in the different areas covered by the study. Some of the ranches were located in the higher mountains

where little crop farming could be done while others were located where some of the land could be farmed rather intensively. This circumstance, of course, influenced the amount of labor that was needed on the different ranches, for although these other enterprises were of less importance than the cattle production they did require time not needed for the cattle.

The number of crop acres per man equivalent should shed some light on the study of labor requirements on these ranches. This measurement factor is presented in Table V-B. Ranch 3 was lowest in crop acres per man equivalent although it was not lowest in pasture acres per man equivalent. The smallest ranch, number 2, was the lowest in this respect. Ranch 1, which was one of the three profitable ranches, had the largest crop area per man equivalent while Ranch 3, which was the most profitable, had the smallest crop area per man equivalent. The third profitable ranch, number 9, was about medium in this respect. Judging from this situation it would seem that not all of the available labor was fully utilized on these ranches. It will be noted from a study of the man equivalent of these ranches that the labor of the operators was all that was needed during many months of the year. It seems reasonable to believe that if one man can furnish all of the labor needed on a large ranch for a certain period of the year the operator of a smaller ranch must not be making the most complete use of his time.

Productive animal units per man equivalent likewise did not directly influence the return on investment of ranches included in this study. This was due in part, at least, to the fact that livestock production was the sole enterprise on some of the ranches while on others one or more minor enterprises also required labor.

Although labor utilization apparently had no great influence on rate of return in this study it would be erroneous to say that it had no effect. On the average, labor was the third largest cash expense on the ten ranches. To say that it had no effect would be to say that cash expense had no effect. Probably a more nearly correct statement would be that the operators of these ranches often failed to make the best use of their own and family labor but did secure the maximum utilization of hired labor. The item of hired labor represents cash expense. As long as it is fully utilized it should have little effect on rate of return.

Other investigators in the field of cattle ranch management also believe that the question of securing proper labor utilization is important. In a previous section four factors were listed that Arizona workers (5) considered to be of major importance in successful cattle ranch operation. One of these four factors was number of cattle handled per man. As had been pointed out this factor is somewhat limited in value on ranches that have enterprises other than cattle production.

Inasmuch as the amount of labor and the manner in which it is used govern to a large extent the production of a ranch and since it represents a very definite expense, labor and its utilization should hold an important place in successful ranch management.

Marketing Practices

Practically all cattle sold from these ten ranches has been classified as feeder stock. Calves have usually been sold in the fall of the year after weaning time. In order to avoid extra winter feeding the ranchers have generally culled their breeding herds in the fall also. Occasional sales have occurred during the winter or in the spring but this has not been the custom on any of the ranches studied. Because of the uniformity of time of selling there is little that can be used as a basis of comparison in this study. It will be noted from a study of Table VI, however, that there was a considerable difference in the price received per head for calves sold from these ten ranches. This may be explained by the fact that the different lots sold varied considerably in age. Some calves were born early in the spring and therefore were much larger than others born later in the season.

There was some variation, however, in method of selling. Certain ranch operators sold cattle to nearby feeders through private sales, others sold through local auction sales, while still others shipped to a central

Table VI: Calf Marketing Data on Ten Cattle Ranches in Larimer County, Colorado

Ranch Number	Month of Sale	Place of Sale	Price recd. per Head	Price recd. per cwt.
1	Dec.	Denver	\$15.00	\$3.25
2	Dec.	Ranch	17.50	-
3	Nov.	Auction	18.10	4.10
4	Nov.	Auction	25.50	4.85
	Nov.	Ranch	13.00	-
5	Nov.	Denver	15.00	3.25
6	Nov.	Ranch	17.00	-
7	Dec.	Ranch	17.50	-
8	Dec.	Ranch	15.00	-
9	Nov.	Ranch	16.00	-
10	Nov.	Ranch	23.10	-

market. There seemed to be little variation in price received when the net price was considered. None of the ten ranchers had followed any one of the above marketing practices over a period of years.

A summary of the marketing procedure on these ten ranches is presented in Table VI. It will be noted that no sales were made before November and that some were delayed until even later. Nearly all of the ranch operators explained that they had held their calf crop somewhat later than usual this particular year in the hope that livestock prices might rise. In normal years their sales would all have been completed not later than November. The price per head received for feeder calves is given in all cases and the prices per hundredweight are also given in cases where the sales were made on a weight basis. The age and weight of the calves at sale time, of course, directly influences the price received for them. Calves born very early in the spring will sell for a higher price in the fall. This will explain the difference

in price per head received for calves sold from Ranch 4.

Based on this one year's record there seems to have been little relation between marketing practice and percent return on investment. Of the three ranches which secured favorable returns on investment the cattle from Ranch 3 were sold through a local auction sale, cattle from Ranch 1 were shipped to a central market, and those from Ranch 9 were sold by private sale to local feeders. It is impossible to compare the prices received, for much of the stock sold on the home ranches was sold by the head rather than by weight. The freight charges to different markets also confuse the problem.

To say that marketing practices have no relation to return on investment would probably be wrong but there did not seem to be an obvious relationship in this study.

Distribution of Investment

In Table VII the total investment of each ranch is divided into Real Estate, Livestock, Machinery and Equipment, and Feed and Supplies. This division is presented in actual amounts in Table VII-A and in percentages in Table VII-B. For convenience in study the percent return on investment for each ranch is also listed. A study of this table will reveal that Ranch 3, which enjoyed the highest return on investment, had by far the lowest percent of the total investment in real estate and the highest percent in livestock. This relationship did not appear to exist, however, as far as the other nine

ranches were concerned. Ranch 1, for instance, which also secured a favorable return, had a very high percent of the total investment in real estate and a very low percent invested in livestock. Whatever the contributing causes may have been there certainly was a wide variation in distribution of investment even among the profitable ranches.

Table VII-A: Summary of Investment on Ten Cattle Ranches in Larimer County, Colorado (Dollars)

Ranch Number	Real Estate	Live-stock	Mach'ry Equip.	Feed & Supplies	Total Invest.
1	\$23150	\$ 2170	\$1395	\$ 342	\$27057
2	6955	2007	425	177	9564
3	19200	10515	795	840	31350
4	49300	13867	900	2591	66658
5	30725	6515	1000	1096	39336
6	27770	2244	400	1323	31737
7	35445	6437	480	1138	43500
8	11350	1328	750	182	13610
9	9520	2480	300	480	12780
10	8565	2090	550	686	11891
Ave.	22198	4965	700	886	28748
High	49300	13867	1395	2591	66658
Low	6955	1328	300	177	9564

Table VII-B: Summary of Investment on Ten Cattle Ranches in Larimer County, Colorado (Percentages)

Ranch Number	Real Estate	Live-stock	Mach'ry Equip.	Feed & Supplies	% Return on Invest.
1	85.57%	8.03%	5.16%	1.23%	0.17%
2	72.72	20.99	4.44	1.85	-4.75
3	61.25	33.54	2.54	2.67	4.00
4	73.96	20.81	1.35	3.88	-0.39
5	78.12	16.56	2.54	2.78	-0.85
6	87.50	7.07	1.26	4.17	-3.57
7	81.48	14.79	1.10	2.63	-3.70
8	83.39	9.76	5.51	1.34	-6.88
9	74.49	19.41	2.35	3.75	0.35
10	72.04	17.57	4.62	5.77	-2.30
Ave.	77.22	17.27	2.43	3.08	-1.79
High	87.50	33.54	5.16	5.77	4.00
Low	61.25	7.07	1.10	1.23	-6.88

Sources of Income

As was stated earlier in this study livestock ranked first as a source of income on all of the ranches. A study of Table VIII will reveal that livestock was the only source of income on ranches 2, 3, 4, 5, 6, and 7. Pasture was important on ranches 1, 8, and 9. This source may be combined with livestock production for the income was derived from livestock even though it was not owned livestock. The ranch operators who followed this practice were merely arranging for a margin of safety for years when pasture might be scarce. The practice of renting out pasture, of course, tends to hold the number of cattle on a ranch below the number that could be maintained in normal years. The practice of pasturing outside stock is a form of cash rent for pasture land. Far more responsibility and expense rests on the ranch operator in this case, for he assumes the responsibility for the care of the stock while it is in his pasture. This means additional expenses as represented by labor and salt which are not present when land is rented. It will be noted from tables VIII-B and VIII-C that Ranch 8, which secured the greatest proportion of its income from pasture, received the lowest net return on investment. It is difficult to estimate accurately the income that might be derived from this additional number of cattle were they owned by the ranch for they would be subject to the cost of winter feed as well as the costs of general livestock care such as taxes, vaccine, and winter death loss.

Table VIII-A: Summary of Receipts on Ten Cattle Ranches in Larimer County, Colorado (Dollars)

Ranch Number	Crops	Live-stock	Incr.Feed & Suppl's	Other Sources	Total Receipts
1	\$170	\$ 784	\$365	\$395	\$1714
2	-	986	151	45	1182
3	-	2683	232	-	2915
4	-	4537	-	-	4537
5	-	2145	-	-	2145
6	-	835	-	-	835
7	-	1612	514	-	2126
8	-	208	-	340	548
9	-	1373	24	256	1653
10	200	1808	-	-	2008
Ave.	37	1697	129	104	1966
High	200	4537	514	395	4537
Low	0	208	0	0	548

Table VIII-B: Summary of Receipts on Ten Cattle Ranches in Larimer County, Colorado (Percentages)

Ranch Number	Crops	Live-stock	Incr.Feed & Suppl's	Pasture*	Other Sources
1	9.92%	45.73%	21.28%	13.13%	9.94%
2	-	83.42	12.77	-	3.81
3	-	92.04	7.96	-	-
4	-	100.00	-	-	-
5	-	100.00	-	-	-
6	-	100.00	-	-	-
7	-	75.82	-	-	24.18
8	-	37.96	-	45.62	16.42
9	-	83.06	1.45	11.86	3.63
10	9.96	90.04	-	-	-
Ave.	-	80.81	-	-	-
High	9.96	100.00	21.28	45.62	24.18
Low	-	37.96	-	-	-

Table VIII-C: Analysis of Income on Ten Cattle Ranches in Larimer County, Colorado

Ranch Number	Farm Income	6% Int. on Invest.	Labor Income	Return on Inv.	%Return on Invest.
1	\$ 596	\$1623	\$-1027	\$ 46	0.17
2	94	574	- 480	- 456	-4.75
3	1858	1881	- 23	1258	4.00
4	337	3999	-3662	- 263	-0.39
5	267	2360	-2093	- 333	-0.85
6	- 534	1904	-2438	-1134	-3.57
7	-1610	2610	-4220	-1610	-3.70
8	- 411	817	-1228	- 936	-6.88
9	595	767	- 172	45	0.35
10	326	713	- 387	- 274	-2.30
Ave.	152	1725	-1573	- 366	-1.79
High	1858	3999	- 23	1258	4.00
Low	-1610	574	-4220	-1610	-6.88

* Included in Other Sources in Table VIII-A.

It will be noted that cattle was the only source of income on the most successful ranch, number 3, while pasture as well as livestock was important on ranches 1 and 9, which were also successful ranches. This difference in sources of income was equally apparent among the less successful ranches as will be noted by a further study of Table VIII. Based on this information it would appear that whether or not a ranch had more than one source of income had comparatively little effect on the rate of return. As far as these ten ranches were concerned all of the sources of income were indirectly related to cattle production. Had they been otherwise the results would probably have been different.

Chief Expenses

Table IX presents the chief expenses of these ten cattle ranches. The first expense listed in the table is the combined item of rent and grazing fees. In practically every case all land rented was used strictly for grazing purposes so this item was combined with grazing fees. The item of feed in the second column means feed other than pasture that has been purchased for livestock on the ranch. A study of Table IX shows that only two ranches had no expense listed under the heading, "Rent and Grazing Fees". One of these, Ranch 1, secured a favorable return while the other, Ranch 8, did not. As far as the feed was concerned all three successful ranches

Table IX-A: Analysis of Current Expense on Ten Cattle Ranches in Larimer County, Colorado (Dollars)

Ranch Number	Rent & Grazing Fees	Feed	Taxes	Labor	Other Expenses
1	\$ 0	\$ 50	\$220	\$ 75	\$176
2	115	418	145	85	133
3	137	64	136	25	275
4	719	834	610	860	295
5	60	290	280	200	536
6	100	138	194	20	111
7	200	293	439	2000	376
8	0	331	123	125	136
9	258	95	145	77	133
10	132	684	148	50	188
Ave.	172	320	244	352	236
High	719	834	610	2000	536
Low	0	50	123	20	111

Table IX-B: Analysis of Current Expense on Ten Cattle Ranches in Larimer County, Colorado (Percent)

Ranch Number	Rent & Grazing Fees	Feed	Taxes	Labor	Other Expenses
1	%	9.58%	42.23%	14.40%	33.79%
2	3.34	46.60	16.16	9.48	24.42
3	23.75	11.09	23.57	4.33	37.26
4	21.67	25.14	18.38	25.92	8.89
5	7.49	31.23	20.50	14.64	36.24
6	17.76	24.51	34.46	3.55	19.74
7	6.05	8.86	13.27	60.43	11.39
8	0	46.29	17.20	16.08	20.43
9	36.44	13.42	20.48	10.88	18.78
10	10.97	56.85	12.22	4.99	14.97
Ave.	12.73	26.36	21.85	16.47	22.59
High	36.44	56.85	42.23	60.43	37.26
Low	0	8.86	12.22	3.55	8.89

Table IX-C: Summary of Expense on Ten Cattle Ranches in Larimer County, Colorado (Dollars)

Ranch Number	Current Expense	Unpaid Family Labor	Depreciation	Decrease Feed & Supplies	Total Expense
1	\$ 521	\$100	\$497	\$ 0	\$1118
2	896	0	192	0	1088
3	577	300	180	0	1057
4	3318	0	393	489	4200
5	1366	0	367	146	1879
6	563	480	315	11	1369
7	3308	0	428	0	3736
8	715	0	230	14	956
9	708	300	50	0	1058
10	1203	100	145	234	1682
Ave.	1318	128	280	89	1815
High	3318	480	497	489	4200
Low	521	0	50	0	959

listed this expense as much less than the average for the ten ranches. The three successful ranches were among the five highest as far as the percent of the total expense represented by taxes was concerned. In the case of labor cost the three successful ranches again were lower than the average for the entire ten ranches.

While few definite conclusions can be drawn from this table it would appear that, for the one year included in this study, the ranches that kept the cash expense for feed and labor to a minimum were the most profitable.

CHAPTER III

SELECTION OF A WORKABLE
SIZE OF RANCH IN LARIMER
COUNTY, COLORADO

A study of the size of the ten ranches included in this survey reveals that they range in size from ranches supporting less than one hundred productive animal units to a ranch that supports over four hundred productive animal units. A further study will reveal that there is one general group of ranches averaging approximately one hundred animal units in size and another group averaging approximately two hundred animal units in size. Inasmuch as each group contained at least one profitable ranch it seems advisable to select two hypothetical ranches rather than just one. Ranch A will be one capable of carrying one hundred productive animal units while Ranch B will be one capable of carrying two hundred productive animal units.

The selection of the factors that make up these two ranches is based very largely upon two sources of information: the first, long time experience of ranch operators and the writer in this area; and second, data presented in the ten ranch study conducted in this area. Greater emphasis will be placed upon the first source rather than the second for it is reasonable to believe

that long time experience will prove to be more reliable than the experience of one year when economic and climatic conditions were below normal. Additional information from other sources will be presented whenever it will clarify any situation.

The various management factors that have been used in the study of these ten ranches, in addition to other factors that were not available in that particular study will be presented in tabular form in this section. Data for the ten ranch average and ranches A and B will be listed in Table X. This table will be divided into two parts so that the discussion will not be far removed from the tabulated material. The factors will be discussed as nearly as possible in the order in which they appear in the table.

Ranch A contains 3840 acres, of which 120 acres is crop land. This crop area allows 1.2 acres per productive animal unit. The area remaining for grazing is 3720 acres which allows 37.2 acres per productive animal unit. Ranch B contains exactly double the area of Ranch A or 7680 acres. This allows the same area of crop and pasture land per productive animal unit for Ranch B as for Ranch A. It will be noted from a study of Table V-C that three of the ten ranches studied had a greater number of acres per productive animal unit than either Ranch A or B. None of these three ranches used National Forest grazing land but all three pastured extra stock during the summer. The average size of ranch found in the ten ranch study was

3996 acres of which 105 acres was crop land and 3891 acres pasture land. This allowed just 0.57 acres of crop land and 25.53 acres of pasture land per productive animal unit. National Forest grazing land was not available to all of the ranches included in the ten ranch survey. Six of the ten ranches made use of it. For this reason ranches A and B are developed so that there will be no dependence on outside pasture. This calls for a large investment in land but much expense for pasture and feed will be eliminated and some saving in labor should result for all of the livestock will be kept within fenced pasture throughout the entire year. The size of the calf crop should be increased on ranches that do not use National Forest grazing land for much closer supervision of the herd during the breeding season should be possible.

The matter of arrangement of the ranch layout is important. It is a common belief among cattlemen of Larimer County that other factors being equal a compactly arranged ranch has a decided advantage over one that is not compactly arranged. There seemed to be little advantage for any particular ranch arrangement apparent in the ten ranch study. Because time is required in driving livestock and moving machinery and equipment from one part of the ranch to another it seems best that ranches A and B shall be arranged compactly with the headquarters in a convenient location.

A summary of the investment of ranches A and B is presented in Table X-A. The same values per unit for

real estate and livestock are used for both hypothetical ranches. The land value is \$4.00 per acre. This totals \$15360 for land for Ranch A and \$30720 for the same for Ranch B. This leaves \$3000 for other real estate on Ranch A and \$4,500 for Ranch B. It seems reasonable that there should be some saving in investment on this item for the larger ranch for buildings and lots will not need to be double in size or number although the ranch may be double in size. The value of \$4.00 per acre is the approximate value per acre of the entire acreage of representative ranches in this area appraised by the Federal Land Bank. This is nearly the same value per acre that was given for the land by the owners of the ten ranches included in the Larimer County survey. The sum of \$4569 for livestock for Ranch A is made up of 3 bulls valued at \$75 each, 88 cows valued at \$40 each, 17 heifers valued at \$22 each, and 6 horses worth on the average \$75 each. The same values for livestock are used to arrive at the sum of \$8813 for Ranch B. The numbers of each type of livestock in this case are bulls, 7; cows, 176; heifers, 34; and horses, 8. The values placed upon cattle were based upon long time records secured by the Bureau of Agricultural Economics from central marketing points. The price used per hundredweight for cows was \$4.00 and for yearling heifers \$5.50.

The machinery and equipment valuation of \$800 for Ranch A and \$1,100 for Ranch B does not represent the purchase price but rather an average value. This is based on machinery and equipment little of which is new but all

of which is still serviceable. A saving is effected here in favor of the larger ranch for it is not necessary to double the amount of machinery and equipment of a ranch when the area is doubled.

The sum of \$1500 for feed and supplies on Ranch A and \$3,000 on Ranch B is made up in part of roughages, mostly hay, grown on the ranches. The total investment for Ranch A is \$25,229 while the total investment for Ranch B is \$47,133. It will be noted from a study of Table X-A that these valuations are high compared to that of the ten ranch average. This difference is due largely to greater land area, higher livestock valuation, and more feed and supplies on the part of the hypothetical ranches.

The summary of investment in dollars that has just been reviewed is also presented in Table X-A in the form of percentages. It may be noted that a smaller percent of the total investment is in real estate on the hypothetical ranches than on the average of the ten ranches. It may also be noted that there is a larger percent of the total investment of the hypothetical ranches in livestock, machinery and equipment, and feed and supplies. There are slight variations between ranches A and B particularly with regard to the investment in machinery and equipment.

The man equivalent on Ranch A is 1.25. This means that three months of labor are needed per year in addition to that of the ranch operator. Practically all of this extra labor will be needed during the haying

season. The man equivalent of Ranch B is 2.00 This does not mean that the full time of two men will be needed throughout the year, however. One man will be able to care for the stock during much of the winter but more than two men will be needed during part of the summer. The number of crop acres per man equivalent on Ranch A is 96 while the number for Ranch B is 120. It will be noted that these figures are higher than the 63 crop acres per man equivalent for the ten ranch average. It is logical that this should be the case for in the theoretical arrangement a far greater proportion of the land has been devoted to crop production than was true of the ten ranches. The factor of pasture acres per man equivalent is also higher for ranches A and B for the original pasture area is much larger.

There are 80 productive animal units per man equivalent on Ranch A and 100 on Ranch B while the number for the ten ranch average was 107. Closer supervision should be possible on the hypothetical ranches than on the average of the ten ranches for there are less animal units to be supervised per man equivalent.

As was explained above the number of acres set aside for the production of crops on Ranch A is 1.2 per productive animal unit. This should allow for the production of 1.50 tons of roughage for each productive animal unit. Calculating 1.50 tons per acre this requires 100 acres of crop land. This leaves a margin of 20 acres

Table X-A: Summary of Ten Ranch Average and of Two Hypothetical Ranches to be Organized in Larimer County, Colorado

	Ten Ranch Average 185 P.A.U.	Ranch A 100 P.A.U.	Ranch B 200 P.A.U.
Size (acres)	3996	3840	7680
Crop Land (acres)	105	120	240
Grazing Land (acres)	3891	3720	7440
Arrangement	C	A	A
Summary of Investment (\$)			
Real Estate	22198	18360	34220
Livestock	4965	4569	8813
Machinery and Equip.	700	800	1100
Feed and Supplies	886	1500	3000
Total	28748	25229	47133
Summary of Investment (5)			
Real Estate	77.22	72.77	72.60
Livestock	17.27	18.11	18.69
Machinery and Equip.	2.43	3.17	2.34
Feed and Supplies	3.08	5.95	6.37
Man Equivalent	1.67	1.25	2.00
Acres per Man Equiv.	2277	3072	3840
Crop Acres per Man Eq.	63	96	120
Past. Acres per Man Eq.	2214	2976	3720
P.A.U. per Man Equiv.	107	80	100
Acres per P.A.U.	26.10	38.40	38.40
Crop Acres per P.A.U.	.57	1.20	1.20
Past. Acres per P.A.U.	25.53	37.20	37.20
Tons Rough. per P.A.U.	-	1.50	1.50
Val. Feed Fed per P.A.U. (4)	6.74	15.00	15.00
\$ Invest. per P.A.U.	207	252	236
% of Invest. in P. A.U.	15.40	16.33	17.43
Number of Bulls	3.8	3	7
Number of Cows	142	88	176
Number Calves Weaned	88	81	158
Number Heifers Retained	-	17	34
Number Calves Sold	67	64	124
Number Cows Sold	29	15	29
% Calf Crop	61.72	92	90
Death Loss (head)	3.61	2	5
% Death Loss	3.21	2	2.50

for the production of other crops. The same proportion holds for Ranch B. The area set aside for pasture, 37.2 acres per productive animal unit, should be sufficient to carry safely 100 productive animals and, in addition, supply some pasture for horses on the ranch. One and one-half tons of good quality roughages per productive animal

unit is a much greater amount of feed than was fed per productive animal unit on the average of the ten Larimer County ranches. Such an amount is necessary, however, in order that particularly severe winters may be weathered safely. This amount of feed together with the pasture that has been allotted for each productive animal unit should be sufficient. Much of the feed that was fed by the Larimer County ranchers was not weighed. Much of it was in the form of concentrates and it was, therefore, impossible to arrive at an accurate estimate of the weight of the feed used. The value of the feed fed to each productive animal unit on the average Larimer County ranch was only \$6.74. Inasmuch as the ranchers valued their hay at \$10 per ton it may readily be seen that their allotment of feed for each animal was very low. The value of \$10 per ton was also used in establishing a price for hay fed on ranches A and B.

The investment per productive animal unit on Ranch A is \$252 while on Ranch B it is \$236. This indicates an apparent advantage for Ranch B. The figure for the ten ranch average was even lower, \$207. This is partially explained by the fact that the hypothetical ranches have more acres per productive animal unit. These amounts are also presented in percentage form in Table X-A. The lowest percent of the total investment in productive livestock was found to be the ten ranch average which was 15.4. The next highest was Ranch A with 16.33 per-

cent, and the highest was Ranch B with 17.43 percent.

There are three bulls on Ranch A. This means approximately 29 cows for each bull. With the careful management of the breeding herd that is possible where no unfenced pasture is used this number should not be too many. The 7 bulls on Ranch B would have approximately 25 cows each. The average number of cows per bull in the Larimer County study was 37. The smaller number of cows per bull on Ranches A and B should lead to higher calf crops than were secured in the Larimer County survey for 1933.

The three bulls, 88 cows, and 17 heifer calves of Ranch A make up 100 productive animal units. The seven bulls, 176 cows and 34 calves make up the 200 productive animal units found on Ranch B. With the careful supervision, adequate feed, and sufficient sires that are possible on Ranch A, a calf crop of 92 percent may be expected. If 17 of these 81 calves are retained for replacement in the breeding herd there will remain to be sold 64. With a two percent death loss occurring, as it probably will, among the cows this will leave 15 cows to be sold each year. With the slightly less careful supervision that might be expected where one man is required to manage a greater number of acres and productive animal units the percent calf crop of Ranch B is 90. Of the 158 calves produced 34 are to be kept for replacement. This leaves 124 to be sold. With a 2.5 percent death loss among the cows there would remain 29 of their number to be sold.

The death loss might not all fall among the cows on these two ranches but it seems probable that it will, for there are many more cows than heifers kept over for the next season. It will be noted that the calf crop of the ten ranch average was only 61.72 percent. The scarcity of feed and the lack of sufficient sires would contribute to the low calf crop. The death loss of 3.21 percent on the ten ranch average was higher than the death loss on Ranches A and B but, again, this might be expected for a scarcity of feed existed in this area during the year covered by this survey.

The average weight of calves sold from ranches A and B as presented in Table X-B is 400 pounds. This weight is a conservative estimate for well bred beef calves that have been on good pasture during the summer and fall. Experience in the area over a long period of time indicates that this weight is reasonable.

The price received for these calves is \$5.50 per hundredweight. As was explained above this price is based upon reports gathered by the Bureau of Agricultural Economics (8) from central marketing points. These reports were gathered over a period of several years. This price is not an average but it is calculated to be a conservative estimate of what cattlemen in Larimer County may expect to receive over a period of years. A 400 pound calf selling for \$5.50 per hundredweight will bring \$22. This price is higher than \$17.52 which was the average

price per head received on the Larimer County ranches. Cattle prices were extremely low in 1933, which was the year covered by the Larimer County study, and it would be expected that the per head price then would be lower than on the hypothetical ranches where a nearly normal price level has been established.

The average weight of cows sold from ranches A and B is 1,000 pounds. This is not an unreasonable weight for high grade beef cows that are in good condition. The price received per hundredweight for these cows is \$4.00. This is in line with the price received for a similar grade of cows at the central markets over a long period of years. The cows on ranches A and B sell for \$40 per head while the cows on the ten ranch average brought only \$24.83 per head. This price difference may be explained by the lack of feed in 1933 and by prevailing low livestock prices.

The cattle from the two hypothetical ranches are marketed during November. At this time farmer feeders are needing stock for their fields and feedlots. These buyers are not on the market until their crops have been harvested and their fields opened. Waiting until later than November to market stock requires additional feed and may entail some loss in weight. These cattle are shipped to a central market where greater numbers of prospective buyers gather than at local sales or auctions.

The 64 calves from Ranch A selling at \$22 per head bring \$1408. The 15 cows selling at \$40 per head bring \$600. One bull selling for \$3.00 per hundredweight

added to the above makes a total income from sale of live stock on Ranch A of \$2,053. Ten extra head of cattle pastured for five months during the summer at \$1.00 per head per month bring in a income of \$50. This practice of pasturing a few extra head of cattle during the summer is a system designed to obtain the maximum use of summer pasture in good years without the danger of being overstocked during poor years.

In the arrangement of farm land made for Ranch A, 100 acres have been set aside to produce roughages for feed purposes. This leaves 20 acres to be used for grain production. During normal years it should be possible to sell grain to the value of \$100 from this area. These items of income together give a total income of \$2203 for Ranch A.

The same method was used in arriving at the total income of Ranch B. The \$4,023 of livestock income is made up of the sale of 124 four hundred pound calves at \$5.50 per hundredweight, 29 one thousand pound cows at \$4.00 per hundredweight, and 3 fifteen hundred pound bulls at \$3.00 per hundredweight. The number of extra cattle, 20 head, pastured on Ranch B is exactly double the number pastured on Ranch A and the income from them is exactly double being \$100. The area of land on Ranch B that is devoted to grain production is double that of Ranch A and the income from it is double being \$200. These sums make a total income for Ranch B of \$4323.

The sale of livestock represents 93.19 percent of the total income of Ranch A and 93.07 percent of the total income of Ranch B, while it represents only 80.81 percent of the total income on the ten ranch average. This lower percent for the Larimer County ranches may be explained by the fact that during this year of low income some of the ranchers sold timber, extra grain, or other products that might increase their incomes. Ranches A and B are designed so that all sources of income, other than livestock, may be dispensed with during periods of unfavorable climatic conditions.

The total expenses on Ranch A for one year are \$1100. Fifty dollars of this amount is represented by feed and salt. The only feeds that it will be necessary to purchase on this ranch are protein concentrates, for they cannot be grown locally. Taxes make up the largest single item of expense, being \$505. The taxes are calculated at the rate of \$25 per one thousand dollars of valuation. This tax rate is not far from the average levied on rural property in this area. The determination was based on a study of the tax rates of all of the school districts in Larimer County.

One hundred fifty dollars is the sum paid for hired labor each year on Ranch A. This is paid at the rate of \$50 per month, which is above the rate paid for hired labor in this area in 1933. The average wage paid to hired hands over a long period of time in this region,

Table X-B: Summary of Ten Ranch Average and of Two Hypothetical Ranches to be Organized in Larimer County, Colorado

	Ten Ranch Average 185 P.A.U.	Ranch A 100 P.A.U.	Ranch B 200 P.A.U.
Ave. Wt. Calves (lbs.)	-	400	400
Price Rcd. per Cwt. (\$)	-	5.50	5.50
Price Rcd. per Head (\$)	17.52	22.00	22.00
Ave. Wt. Cows (lbs.)	-	1000	1000
Price Rcd. per Cwt. (\$)	-	4.00	4.00
Price Rcd. per Head (\$)	24.83	40.00	40.00
Date of Sale	-	Nov. 1	Nov. 1
Place of Sale	-	Central Market	Central Market
Receipts (\$)			
Livestock	1697.00	2053.00	4023.00
Pasture	-	50.00	100.00
Crops	-	100.00	200.00
*Total	1966.00	2203.00	4323.00
Receipts (%)			
Livestock	80.81	93.19	93.07
Pasture	-	2.27	2.31
Crops	-	4.54	4.62
Expenses (\$)			
Rent and Grazing Fees	172.00	-	-
Feed	320.00	50.00	100.00
Taxes	244.00	505.00	943.00
Labor	352.00	150.00	600.00
Other	236.00	395.00	975.00
Total	1318.00	1100.00	2618.00
Expenses (%)			
Rent and Grazing Feed	12.73	-	-
Feed	26.36	4.54	3.82
Taxes	21.85	45.91	36.02
Labor	16.47	13.64	22.92
Other	22.59	35.91	37.24
Farm Income (\$)	152.00	1103.00	1705.00
6% Int. on Investment (\$)	1725.00	1514.00	2828.00
Labor Income (\$)	-1573.00	-411.00	-1123.00
Value Operator's Labor (\$)	600.00	600.00	600.00
Net Return (\$)	-366.00	503.00	1105.00
% Return on Investment	-1.79	2.00	2.32

however, approximates \$50 per month. The item of other expense is made up largely as a miscellaneous fund to care for the purchase of bulls, vaccine, repairs, and general ranch supplies.

* Other sources included in ten ranch average

The charge for feed on Ranch B is \$100 which is exactly double the charge on Ranch A. This is reasonable, for Ranch B is exactly double the size of Ranch A and maintains twice the number of cattle. The taxes are levied at the same rate but because the total investment is not one hundred percent greater than that of Ranch A the tax charge is not one hundred percent greater.

There are twelve months of extra labor required on Ranch B. At the rate of \$50 per month this amounts to \$600. The item of \$975 for other expenses for Ranch B is largely because an allowance is being made for the purchase of three bulls, if necessary, at \$125 per head. The other miscellaneous expenses are proportionate to those of Ranch A. The charge for total expense on Ranch B is \$2618.

It will be noted that there is no expense listed on either of the hypothetical ranches for rent and grazing fees. As was explained above sufficient pasture is available on these ranches to care for all of the stock on them without securing outside range. This was not the case in the Larimer County study, for there 12.73 percent of the total expense was made up of rent and grazing fees. The purchase of feed on the Larimer County ranches made up 26.36 percent of the total while it represented less than five percent of the total on the hypothetical ranches.

Taxes were not as great in proportion to other expenses on the Larimer County ranches as on ranches A and B. The total investments of the Larimer County ranches did

not run as high on the average as did the total investments of Ranches A and B. The percent of the total expense that is represented by labor in the ten ranch survey was also lower in relation to the labor charge for thy hypothetical ranches. The wages paid for labor on the Larimer County ranches in 1933, as revealed by the survey, were not as high as the rate established for Ranches A and B. However, the rate used on these two ranches is more nearly in line with the rate paid on these ranches over an extended period of years.

Not many purchases of bulls were made by the ten Larimer County ranchers in 1933 and, for this reason, the charge for other expenses on their ranches is proportionately lower.

The total expenses of Ranch A subtracted from the total receipts leaves a farm income of \$1,103. The total expenses of Ranch B subtracted from the total receipts leave a farm income of \$1,705. This shows a decided advantage in favor of the larger ranch. The average farm income found in the Larimer County study was \$152. This is not surprising considering the fact that the ten ranch study covered a very unfavorable year.

The approximate rate of interest on borrowed capital paid by farmers in Larimer County is six percent. Short time loans require a higher rate and long time loans require a lower rate but the average is not far from the figure used here. Six percent of the beginning investment

subtracted from the farm income leaves, in the case of Ranch A, a negative labor income of \$411. Because of a larger investment for Ranch B its labor income is a negative \$1,123. The average labor income on the ten Larimer County ranches was a negative \$1,572.

The value of the operator's labor in all cases was \$600. This amount subtracted from the farm income of Ranch A leaves a net income of \$503. The net income of Ranch B is \$1105 which, again, shows an advantage for the larger ranch. Because the value of the operator's labor on the Larimer County ranches was larger than the farm income the net income was, of course, a negative sum.

The average return on investment on the ten ranches studied was a negative 1.79 percent. The return on investment for Ranch A is 2.00 percent while the return on investment for Ranch B is 2.32 percent. These two ranches have been established so that they may operate successfully during unfavorable years. They should return this small percent on investment even then. During years when cattle prices are higher than the base used here or when less than \$15 in value of feed per productive animal unit is needed the return should be a much higher figure.

This summary shows a slight advantage in favor of the larger ranch in farm income, net income, and percent return on investment. It is reasonable to believe that, with equally efficient management a business enterprise with a larger investment doing a greater volume of business should return a higher percent on its investment

than a smaller business that is similar in nature.

CHAPTER IV

SUMMARY AND CONCLUSIONS

Summary

The problem of securing the greatest possible return with a minimum of expense is present in any form of business enterprise. Varying factors such as weather conditions, overgrazing, disease, predatory animals, labor supply, and feed and livestock prices have influenced the solution of this problem as it relates to the production of cattle in Larimer County, Colorado. In this study an attempt has been made to review some of these factors and as a result to offer suggestions for cattle ranch improvement in this and similar areas.

The ranches included in this study are located in central Larimer County, Colorado. The topography of this area varies from open valleys and parks to steep, rugged mountains. The majority of the land lies between these extremes. Most of the area lies in the 16 to 20 inch rainfall belt although a small portion of the eastern edge lies within the 13 to 16 inch rainfall belt. The average frost-free period is slightly over 100 days. The type of farming varies greatly. A large part of the land is devoted to the production of range cattle. The most common size of stock ranch in the county is from 1,000 to

4,999 acres. Cattle ranching began in the area shortly after 1860 and developed rapidly in the following years.

Surveys similar in nature to this were conducted in Colorado by R. T. Burdick, Martin Reinholt, and G. S. Klemmensen of the Colorado Agricultural College Experiment Station; in Wyoming by A. F. Vass and Harry Pearson of the Wyoming Agricultural Experiment Station; in Nevada by the University of Nevada Agricultural Experiment Station; and in Arizona by the University of Arizona. These studies have been referred to repeatedly in the development of this particular study. The ranch records used as a basis for this study cover the calendar year of 1933. They were secured by the writer directly from the ranch operators. The records were summarized using United States Department of Agriculture Farm Management Summary Sheets for Northern States.

In the description and the study of these ten ranches various management factors were used. The first was size and arrangement. The size of these ranches varied from 1210 acres to ten times that area or 12,100 acres. The average size was 3,996 acres. Nearly all of the ranches fell within the 1,000 to 4,999 acre group which was the most common size of stock ranch for the entire county. The most common size of ranch in this study was from 3,000 acres to 3,400 acres. The three most profitable ranches were all of medium size. There was no uniformity in arrangement of layout. Even the three profitable ranches were not similar in arrangement. The most profitable of

the group was the most compactly arranged. The largest number of productive animal units on any one ranch was 485. The smallest number was 37. The average number was 185. There was little uniformity either in type of feed fed or method of feeding on these ranches. Alfalfa hay was the most common type of feed. The most successful ranch fed only \$1.88 in value of total feed other than pasture per productive animal unit. The other two successful ranches ranked next low in this respect.

The average death loss on these ranches was 3.21 percent. The lowest loss was 0.70 percent and the highest was 7.60 percent. The highest percent calf crop was 90.77 which was secured by the smallest ranch. The smallest calf crop was 45.51 percent and the average was 61.72 percent. The smallest ranch studied had the lowest man equivalent, 1.25, while the largest ranch had the highest man equivalent, 2.33. The average was 1.67. Practically all cattle sold from these ranches were classed as feeder stock. Most of the increase was sold as calves.

The distribution of investment among the different important items varied. It was noticeable that the most successful ranch had the highest percent of the total invested in livestock in comparison to the other nine ranches. Cattle were the main source of income on all ranches including the most profitable one. The other sources were pasture and sale of crops. It was found that purchase of feed, taxes, labor, and grazing fees were the

most important expenses on these ranches.

Two hypothetical ranches A and B were developed based upon long time experience of ranchers in the area. Ranch A, which was the smaller of the two ranches was compact and well arranged and contained 3,840 acres of which 120 acres were crop land. The larger of the two, Ranch B, was also compactly arranged and contained 7,680 acres of which 240 acres were crop land.

The total investment of Ranch A was \$25,229 of which 72.77 percent was real estate, 18.11 percent livestock, 3.17 percent machinery and equipment, and 5.95 percent feed and supplies. The total investment of Ranch B was \$47,133 of which 72.60 percent was real estate, 18.69 percent livestock, 2.34 percent machinery and equipment, and 6.37 percent feed and supplies. The percentages on the average of the ten Larimer County ranches varied from these although not greatly.

The man equivalent on Ranch A was 1.25 which represents fifteen months of man labor annually. The man equivalent on Ranch B was 2.00 which represents twenty-four months of man labor each year. The man equivalent for the ten ranch average was 1.67. The crop acres per man equivalent on Ranch A were 96 while on Ranch B they were 120. The pasture acres on Ranch A were 2,976 while on Ranch B they were 3,720. These figures were higher than on the ten ranch average. Ranch A maintained 100 productive animal units while Ranch B maintained 200.

There were 80 productive animal units per man equivalent on Ranch A and 100 on Ranch B. In both cases these factors were lower than on the average of the ten Larimer County ranches.

There were 1.2 crop acres and 37.2 pasture acres per productive animal unit on each of the two hypothetical ranches. These areas were much greater than on the ten ranch average. There were 1.5 tons of roughages produced for each productive animal unit on both Ranches A and B. This was a very great deal more than was fed on the Larimer County ranches. This feed was valued at \$10 per ton.

There was \$252 of investment per productive animal unit on Ranch A and \$336 on Ranch B. The average for the ten ranches was \$207. Ranch B had the highest percent of the total investment in productive animals with Ranch A being slightly lower and the ten ranch average being still lower.

There were three bulls, 81 cows, and 17 heifers on Ranch A. On Ranch B there were seven bulls, 176 cows, and 34 heifers. The percent calf crop for Ranch A was 92 while that for Ranch B was 90. These percentages are both much higher than the 61.72 percent which was the average on the ten ranches.

The death loss on Ranch A was two percent while on Ranch B it was two and one-half percent. The average for the Larimer County ranches was 3.21 percent.

The average weight of calves sold from these

two ranches was 400 pounds and the price received was \$5.50 per hundred weight. The average weight of cows sold was 1,000 pounds and the price received for them was \$4.00 per hundredweight. This stock was sold at a central market in November.

The total receipts on Ranch A were \$2203 of which 93.19 percent was derived directly from livestock, 2.27 percent from pasture, and 4.54 percent from the sale of crops. The total receipts on Ranch B were \$4,323 of which 93.07 percent came from livestock, 2.31 percent from pasture, and 4.62 percent from sale of crops. A much higher percent of the total income on these two ranches was derived from livestock than was true of the ranches included in the Larimer County survey.

The total expense on Ranch A was \$1,100 of which 4.54 percent was for feed, 45.91 percent for taxes, 13.64 percent for labor, and 35.91 percent for purchase of bulls and for general ranch supplies. The total expense on Ranch B was \$2,618 of which 3.82 percent was for feed, 36.02 percent for taxes, 22.92 percent for labor, and 37.24 percent for the miscellaneous expenses. There was no expense on Ranches A and B for rent or grazing fees. The ranches were of sufficient size to ensure the production of ample feed for the livestock to be maintained on them.

The farm income of Ranch A was \$1,103 while that of Ranch B was \$1,705. The interest calculated on investment on all of these ranches was six percent. The labor

income in all cases was a negative sum. The value of the operator's labor in all cases was \$600. The return on investment of Ranch A was \$503 while that of Ranch B was \$1,105. The percentage return on investment of Ranch A was 2.00 percent and for Ranch B, 2.32 percent. The average for the ten ranches was a negative 1.79 percent.

This summary shows some advantage for the larger ranch. This is reasonable for a business enterprise that has a greater investment and a larger volume of business than another of similar nature should return a higher percent on its investment.

Conclusions

The following conclusions are based upon the results of this analysis of ten cattle ranches in Larimer County, Colorado, and upon long time experience of ranch operators in the area.

Ranches containing 3,000 acres to 3,500 acres were the most profitable. Ranches containing less than 2,000 acres were too small to secure the most efficient use of labor and equipment.

Judging by the results of the Larimer County study conducted in 1933 the value of \$4.00 per acre for land is too high. Judging from long time experience of ranchers in the county, however, increased livestock prices and decreased feed costs during favorable periods will yield an average yearly return over a number of

years that will justify this valuation.

Much time has been wasted in transferring livestock and equipment on ranches that are not compactly arranged. More attention should be given the matter of arrangement of ranch layout.

There is room for much improvement in size of calf crop. The average is far lower than it should be on these ranches. More careful supervision during the breeding season, as well as heavier feeding during the two months prior to calving should help materially.

In some cases winter death losses were high because of scant feeding.

There has been little uniformity in livestock feeding practice during periods of scant feed supply. Ranch operators should maintain a supply of feed above that required for normal years. This extra feed should be kept on hand as a precaution against drouth periods. Because of a failure to follow this practice the purchase of feed has represented too large a part of the ranch expense.

A well organized, carefully managed ranch, preferably large enough to maintain at least 200 productive animal units should yield a positive return on investment even during periods of comparatively low cattle prices. During normal times the return should be somewhat higher and during periods when livestock prices are high and feed requirements low the return should be decidedly satisfactory.

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ABSTRACT OF THESIS

The problem of securing the greatest possible return with a minimum of expense is present in any business enterprise. Varying factors have influenced the solution of this problem as it relates to the production of cattle in Larimer County, Colorado. In this study an attempt has been made to determine some of these factors and as a result to obtain definite suggestions for cattle ranch improvement in this and similar areas.

The ranches included in this study are located in central Larimer County, Colorado. The topography of this area varies from open valleys and parks to steep, rugged mountains. The greater part of the land lies between these extremes. Most of the area lies in the 16 to 20 inch rainfall belt although a small portion of the central eastern edge lies within the 13 to 16 inch rainfall belt. The average frost-free period is slightly more than 100 days. A large part of the land is devoted to the production of range cattle. The most common size of stock ranch in the county is from 1,000 acres to 4,999 acres. Cattle ranching began in the area shortly after 1860 and developed rapidly in the following years.

Ten ranch records covering the calendar year of 1953 were secured by the writer directly from the ranch operators in central Larimer County. The records were

summarized using United States Department of Agriculture Farm Management Summary Sheets for Northern States.

The size of these ranches varied from 1,210 acres to ten times that area or 12,100 acres. The most common size was from 3,000 acres to 3,400 acres. Three of the ten ranches were profitable and all three fell within this most common size group. There was no uniformity in arrangement of layout even among the three profitable ranches. However, the most profitable of the group was the most compactly arranged. The largest number of productive animal units on one ranch was 485 while the smallest number was 37. The average number was 185. There was little uniformity either in type of feed fed or in method of feeding on these ranches. Alfalfa hay was the most common type of feed. The most successful ranch fed only \$1.88 in value of feed, other than pasture, per productive animal unit and the other two successful ranches ranked next low in this respect. The average death loss on the ten ranches was 3.21 percent. The lowest loss was 0.70 percent while the highest was 7.60 percent. The highest percent calf crop was 90.77 which was secured by the smallest ranch. The smallest calf crop was 45.51 percent and the average was 61.72 percent. The smallest ranch studied had the lowest man equivalent, 1.25, while the largest ranch had the highest man equivalent, 2.33. The average was 1.67. Practically all cattle sold from these ranches were classed as feeder

stock. Most of the increase were sold as calves.

The distribution of investment among the different important items varied. It was noticeable that the most successful ranch had the highest percent of the total invested in livestock. Cattle were the main source of income on all of the ranches and were the only source on three of the ranches including the most profitable ranch. Other important sources of income were rent of pasture and sale of crops. Taxes, labor, grazing fee, and purchase of feed were the most important ranch expenses.

Two hypothetical ranches were developed based upon the results obtained in this study and upon long time experience of ranch operators in the area. The smaller of these two, Ranch A, was compact and contained 3,840 acres of which 120 acres were set aside for crop production. This ranch was established to maintain 100 productive animal units. This allowed 1.2 crop acres and 37.2 pasture acres per productive animal unit. The other ranch B, was also compact and contained 7,680 acres of which 240 acres were set aside for crop production. This gave the same area per productive animal unit as for ranch A. The total invested in Ranch A was \$25,229 and the total invested in Ranch B was \$47,133. Approximately 73 percent of the investment of each of these ranches was in real estate.

The man equivalent of Ranch A was 1.25 while that

of Ranch B was 2.00. There were 96 crop acres and 2976 pasture acres per man equivalent on ranch A and 120 crop acres and 3720 pasture acres per man equivalent on Ranch B. There were 80 productive animal units per man equivalent on Ranch A and 100 on Ranch B. There were 1.2 crop acres and 37.2 pasture acres per productive animal unit on each of the two hypothetical ranches. One and one-half tons of roughages were fed per productive animal unit on each of these ranches. This feed was valued at \$10 per ton. Sixteen and one-third percent of the total investment of Ranch A and 17.43 percent of the total investment of Ranch B was in productive animals.

There were three bulls, 88 cows, and 17 heifers on Ranch A while there were seven bulls, 176 cows, and 34 heifers on Ranch B. The death loss on Ranch A was 2.00 percent and on Ranch B it was 2.5 percent. The calf crop on Ranch A was 92 percent and on Ranch B it was 90 percent.

The average weight of calves sold from these two ranches was 400 pounds. These sold for \$5.50 per hundredweight. The average weight of cows sold was 1000 pounds and they brought \$4.00 per hundredweight. This stock was sold at a central market in November.

The total receipts of Ranch A were \$2203 of which 93.19 percent were from livestock. The total receipts of Ranch B were \$4323 of which 93.07 percent were from livestock.

The total expenses of Ranch A were \$1100 of which 4.54 percent was for feed, 45.91 for taxes, 13.64 percent for labor, and 35.91 percent for miscellaneous expenses. The total expenses of Ranch B were \$2618 of which 3.82 percent was for feed, 36.02 percent for taxes, 22.92 percent for labor, and 37.24 percent for miscellaneous expenses.

The farm income for Ranch A was \$1103 and for Ranch B \$1705. Six percent was the rate of interest calculated on the beginning investment. The labor income in both cases was a negative sum. The value of the operator's labor in all cases was \$600. The net income of Ranch A was \$503 while that of Ranch B was \$1105. The return on investment of Ranch A was 2.00 percent and that of Ranch B was 2.32 percent.

This shows an advantage for the larger ranch. This is reasonable for a business enterprise that has a greater investment and a larger volume of business than another of similar nature should return a higher percent on its investment.

The following conclusions are based upon the results of this analysis of ten cattle ranches in Larimer County, Colorado, and upon long time experience of ranch operators in the area.

Ranches containing 3,000 acres to 3,500 acres were the most profitable. Ranches containing less than 2,000 acres were too small to secure the most efficient use of

labor and equipment.

Judging by the results of the Larimer County study conducted in 1933 the value of \$4 per acre for land is too high. Judging from long time experience of ranchers in the county, however, increased livestock prices and decreased feed costs during favorable periods will yield an average yearly return over a number of years that will justify this valuation.

Much time has been wasted in transferring livestock and equipment on ranches that are not compactly arranged. More attention should be given the matter of arrangement of ranch layout.

There is room for much improvement in size of calf crop. The average is far lower than it should be on these ranches. More careful supervision during the breeding season, as well as heavier feeding during the two months prior to calving should help materially.

In some cases winter death losses were high because of scant feeding.

There has been little uniformity in livestock feeding practice during periods of scant feed supply. Ranch operators should maintain a supply of feed above that required for normal years. This extra feed should be kept on hand as a precaution against drouth periods. Because of a failure to follow this practice the purchase of feed has represented too large a part of the ranch expense.

A well organized, carefully managed ranch, preferably large enough to maintain at least 200 productive animal units should yield a positive return on investment even during periods of comparatively low livestock prices. During normal times the return should be somewhat higher and during periods when livestock prices are high and feed requirements low the return should be decidedly satisfactory.